ART. XX.—*Further Observations on the Condition of the Blood after Death from Snake-Bite.* By GEORGE B. HALFORD, M.D., Professor of Anatomy, Physiology, and Pathology in the University of Melbourne.

[Read 14th October, 1867.]

MR. PRESIDENT AND GENTLEMEN,

Since I had last the honour to bring this subject under the notice of this Society, I have made numerous experiments on dogs and cats, and in all, so far as regards the presence of the foreign cell, with similar results. A multitude of conjectures crowd round the origin of this cell and the interpretation to be put upon its presence; but I shall this evening confine myself to what I have been hitherto able to make out of its life, and of the passage of the poison from the mother to the embryo.

Nothing, perhaps, is more difficult and tedious than to trace the growth of a microscopic particle, but I will endeavour in a few words, and by the help of diagrams and microscopic preparations, to explain all I have been enabled to learn of this important subject. Blood soon drawn from an animal bitten by a snake contains a larger amount of nebulous or finely granular matter than is usually seen. After the lapse of one hour this nebulous matter is much increased in quantity, lying in the intervals of the red corpuscles, and presently breaking up into small masses, out of which the cell is gradually evolved. In two hours after the bite the cells may be seen in great numbers, but very indistinct. From this time every further microscopic observation shows them in great abundance, and from the sixth to the twelfth hour they may be seen in perfection, macula and nucleus included. Whilst this is taking place the nebulous matter disappears. The nebulous matter may, therefore, be regarded as the germinal matter out of which the cells are formed. At this time the cell-wall is extremely delicate, the macula very plain as a bright particle, and the nucleus either single, reniform, double, triple, or multiple. It would appear the cells are then increasing in number by division of their nuclei, and minute particles having the vibratory movement of molecules in fluid, may be seen between the nucleus and cell-wall. On one occasion I watched for upwards of half an hour a constant revolution within the cell of a particle corres-

ponding in all particulars to a macula. This particle passed regularly round the nucleus at a uniform rate, revolving both in the direction of and against the current of the fluid in which the cell was floating, reminding one of the movements seen in Valesneria, &c. Twenty-four hours after the bite, the cells attain their greatest size, and, supposing the animal then dead, have probably ceased multiplying, and are simply living, or perhaps growing, the nucleus being usually single, the macula extremely distinct, and the cell very large. It is not uncommon at this time and later to see a cup-shaped hiatus in the cell-wall from which the macula has escaped. The cells may be seen in the blood for many days, their presence seeming to be a preservative against putrefaction. Where they have most room, as in the venæ cavæ, cranial sinuses, and cavities of the heart, they attain the greatest size and most circular form. In every instance the cell-wall is very elastic, and accommodates itself to surrounding pressure. To ascertain how soon after inoculation these cells appear is a matter of some difficulty. It is not necessary to suppose that at first they are very numerous, and in order to detect them so early it might require fifty or a hundred microscopes and observers at work at the same instant; still, from their having been seen two hours after the bite, and from all we know of the rapidity with which new formations occcur, both in health and disease, it is doubtless extremely soon. Of one thing we are sure—viz., that the nebulous germinal matter from which they spring is within a few minutes diffused all over the body; for, supposing an animal to die in five minutes, and hence all circulation stopped, the cells are as readily seen in its blood a few hours after death as if it had lived as many hours as we say minutes. The macula is, doubtless, a particle of germinal matter, but whether it is to be regarded as that from which the whole cell has sprung, or whether it has been detached from the nucleus, and is destined for independent existence, it is hard to say. The fact that it is almost invariably large when the cell is small, and small when the cell is large, favours the first view. Perhaps the most important point must be left still undecided. Has the blood built up these cells directly or indirectly from the germinal matter of the serpent? The answer to this question I will endeavour to give at a future meeting. I have many observations on this subject, but they are not yet completed. In either case the result is the same—*Storing up of force in the new*

growth, at the expense of the nutritive properties of the blood, and by perversion of those chemical changes necessary to the maintenance of the life of the infected animal. That the germinal matter exists in a state of extreme minuteness, the following experiment shows :—A cat being with young was inoculated with the poison, and dying in three hours, her four kittens were removed from the womb. They were all dead, and their blood contained the foreign cells, as did that of the mother. To pass from the cat to the kittens, the germinal matter must have penetrated the delicate membrane covering the tufts of the fœtal vessels. If the poison of serpents can thus readily be traced through the body, and from parent to offspring, why should not the path of all infections be tracked ? Some months ago, it was stated that it was conjectured that a child had been bitten by a snake. No doubt need ever exist for the future ; a drop of blood will always furnish the necessary evidence. I trust the subject will call forth other investigators in Victoria, for it will assuredly be taken up at home. It has been to me a matter of surprise that while this colony very properly appoints men to survey her coasts, explore her skies, and the ground beneath her feet, no one systematically explores her diseases, a subject in which the rich and poor, the living and those about to live, are equally and deeply concerned, and in comparison with which many other subjects that excite her people are trifles. I cannot conclude without thanking Dr. Gummow, of Swan-hill, for having sent me such a fine supply of snakes, nor without expressing my acknowledgments to Messrs. Lawrence and Ashworth for their ready assistance in my many experiments.

ART. XXI.—*Notes on the* REV. J. E. TENISON WOODS' *paper "On the Glacial Epoch of Australia."* By JULIUS HAAST, PH. D., F.R.S.

[Read 14th October, 1867.]

In the "Transactions of the Royal Society of Victoria," part 1, vol. viii., which I received a few weeks ago, I find an interesting and suggestive paper written by the Rev. J. E. Tenison Woods, "On the Glacial Period of Australia," and read March 4th, 1867, on which I beg to offer a few observations ; the more so, as the author, when alluding to New Zealand, does me the honour to refer to my labours.